between procedural and clinical success in the treatment of renal artery stenosis may, at least in part, stem from the limitations of angiography and the assessment of the significance of renal artery stenosis. The authors therefore sought to compare the diagnostic accuracy of renal artery translesional pressure gradients, intravascular ultrasound (IVUS) imaging, and angiographic parameters in predicting hypertension improvement after stenting of renal artery stenosis. Their hope was to establish criteria where stenting of the renal artery can be justified by improved hypertension control.

Sixty-two patients with renal artery stenosis had assessment of transstenosis pressure gradients (resting and hyperemic systolic gradient, fractional flow reserve, and mean gradients) as measured by pressure guidewires and IVUS and angiographic parameters of minimal lumen diameter such as area stenosis and diameter stenosis. Patients with renal artery stenosis were enrolled in the study if the systolic blood pressure was >140 mm Hg or the diastolic blood pressure was >90 mm Hg, or both, or they had accelerated or refractory hypertension on two or three antihypertensive medications. Hypertension improvement was defined as a diastolic blood pressure of <90 mm Hg or a systolic blood pressure of <140 mm Hg, or both, or a reduction in diastolic blood pressure by at least 15 mm Hg with the same or reduced number of antihypertensive medications. Receiver-operating characteristic (ROC) analysis determined optimal cutoff values of transpressure gradients, IVUS parameters, and angiographic parameters in predicting hypertension improvement at 12 months. Cut points that yield the greatest sum of sensitivity and specificity were selected. The area under the curve for the ROC (AUROC) analysis was compared for each of the hemodynamic and anatomic parameters assessed.

Hyperemic pressure gradients were determined across the renal artery stenosis by first advancing the pressure wire through the stenosis and then injecting a 30-mg bolus of papaverine into the renal artery. After the papaverine injection, the guiding catheter was retracted from the ostial of the renal artery and the renal artery pressure gradients were obtained.

The hyperemic systolic pressure gradient had a larger AUROC curve than most other parameters. A hyperemic systolic pressure gradient ≥21 mm Hg had the highest sensitivity, specificity, and accuracy (82%, 84%, and 84%) in predicting hypertension improvement after stenting of renal artery stenosis. Stenosis as determined by the average IVUS area was significantly greater in renal artery lesions with a hyperemic systolic pressure gradient >21 mm Hg vs those with gradients <21 mm Hg (78% vs 38%, $P < .001$). In 36 patients with hyperemic systolic pressure gradients >21 mm Hg, hypertension improved in 84% after renal artery stenting. In patients with hyperemic systolic gradients <21 mm Hg, hypertension improved in 12 months in 36% of patients (n = 26, $P < .01$). Multivariable analysis showed the hyperemic systolic pressure gradient was the only parameter that independently predicted hypertension improvement (odds ratio, 1.39; 95% confidence interval, 1.05-1.65; $P = .013$).

Comment: The problem with this study, of course, is that hyperemic systolic pressure gradients can only be obtained once a catheter is placed across the renal artery lesion. The practical point is that once someone has placed a wire across the renal artery lesion, it would be very difficult to avoid the temptation to stent that lesion regardless of the pressure gradient measured. The concept that hemodynamic gradients are more important than the angiographic severity is likely valid and makes sense. A correlation with hyperemic systolic pressure gradients with ultrasound findings would seem to be the next step in trying to determine the practicality of hyperemic pressure gradients in selecting patients for renal artery stenting. See also the abstract "Revascularization vs. medical therapy for renal-artery stenosis" by the ASTRAL investigators in this abstract section of the journal.

Racial and Ethnic Disparities in Outcomes and Appropriateness of Carotid Endarterectomy: Impact of Patient and Provider Factors

Halm EA, Tuhrim S, Wang JJ, et al. Stroke 2009;40:2493-501.

Conclusion: Minorities have worse outcomes and higher rates of inappropriate carotid endarterectomy (CEA).

Summary: There are many variables that lead to inequities in quality and outcomes of health care. Access to care, particularly adequate insurance, appears to be a major driver of disparities in care. However, inequities exist even among well-insured patients. Other possible drivers of inequities in health care include racial and ethnic differences and underlying social demographic characteristics, as well as severity of comorbid illnesses and overall disease burden. Minority patients may also receive care by physicians and in hospitals with lower levels of cultural competence than would be ideal. There is therefore a current emphasis on identifying how patients' disease burden and physician or hospital factors, or both, can contribute to disparities among care in minority patients.

This study evaluated disparities and outcomes of CEA with respect to race and ethnicity. This was a population-based cohort of CEA patients derived from a list of Medicare beneficiaries in New York. Data were abstracted from medical records to assess social demographics, disease severity, comorbidities, indication for CEA, and strokes and deaths within 10 days of surgery. Appropriateness of CEA was based on validating criteria from a national expert panel. Differences in providers, patients, appropriateness of surgery, and outcomes were compared using χ^2 tests. Multiple logistic regression analysis was used to evaluate differences in risk-adjusted rates of death or nonfatal stroke with adjustments for patient, physician, and hospital-level risk factors.

Of 9093 patients undergoing CEA overall, 95.3% were white, 2.5% were black, and 2.2% were Hispanic. Analysis indicated minorities had more severe neurologic disease, more comorbidity, and were more likely to be cared for by lower-volume surgeons and hospitals ($P < .0001$). The 30-day stroke and death rates were higher in Hispanics (9.5%) and blacks (6.9%) than in whites (3.8%, $P < .0001$). When adjusting for presurgical patient risk and provider characteristics, multivariable analysis indicated that blacks no longer had significantly worse outcomes (odds ratio, 1.37; 95% confidence interval, 0.78-2.40). Even after adjustments, however, a higher risk of death and stroke persisted in Hispanic patients (odds ratio, 1.87; 95% confidence interval, 1.07-3.19). This was largely due to higher comorbidity in minorities and higher rates of inappropriate surgery (Hispanics, 17.6%; blacks, 13.0%; whites, 7.9%; $P < .0001$).

Comment: This study suggests that, at least with regard to endarterectomy, surgical outcomes in minority patients are driven largely by patient presurgical risk and experience and skill of the specific physicians performing the procedure. That Hispanic patients have the highest incidence of perioperative stroke after CEA is a new finding. Adjustment for patient, surgeon, and hospital factors diminished excess risk among Hispanics, but Hispanic patients still had nearly double the risk of death or stroke in the multivariable model used. The interaction of Hispanic people with the medical system has received relatively little attention. Thankfully, this now appears to be changing.

Revascularization vs Medical Therapy for Renal-Artery Stenosis

The ASTRAL Investigators. N Engl J Med 2009;361:1953-62.

Conclusion: There is no significant clinical benefit from renal artery revascularization in patients with renal artery atherosclerotic disease.

Summary: Renal artery stenosis is associated with chronic kidney disease and hypertension. It is, however, not clear that these associations are causal. In fact, three small randomized control trials have showed no benefit of renal artery angioplasty compared with medical therapy (Hypertension 1998;31:823-9; J Hum Hypertens 1998;12:329-35; N Engl J Med 2000; 342:1007-14). These studies were small and underpowered to detect potentially clinically worthwhile improvements in renal function, blood pressure, or mortality rates. The current Angioplasty and Stent for Renal Artery Lesions (ASTRAL) trial is a randomized unblinded trial in which 806 patients with atherosclerotic renal vascular disease were assigned to undergo medical therapy alone or renal revascularization (renal angioplasty with or without a stent and without renal protection) in addition to medical therapy. Renal function measured by the reciprocal of the serum creatinine level (a value that has a linear relationship with creatinine clearance) was the primary outcome measure. Secondary outcomes were the times to renal and major cardiovascular events, death, and blood pressure. Medium follow-up was 34 months.

During a 5-year period, progression of renal impairment (defined by the slope of the reciprocal of the serum creatinine level) was -0.07×10^{-3} L/μmol per year in the revascularization group and -0.13×10^{-3} L/μmol per year in the medical therapy group. This difference of 0.06×10^{-3} L/μmol per year favors revascularization (95% confidence interval [CI], −0.002 to 0.13; $P = .06$). Mean serum creatinine was 0.02 mg/dL lower in the revascularization group than in the medical therapy group (95% CI, −0.10 to 0.06). There was no significant difference between groups in systolic blood pressure. The decrease in diastolic blood pressure was smaller in the revascularization group than in the medical therapy group. There were similar rates of renal events in the two groups (hazard ratio in the revascularization group: 0.97; 95% CI, 0.67-1.4; $P = .88$). There were no significant differences in major cardiovascular events ($P = .61$) and death ($P = .46$) between the two groups. In the revascularization group, 23% of patients had significant complications associated with revascularization, including three amputations of toes or limbs and two deaths.

Comment: The study indicates no benefit from revascularization in patients with renal artery stenosis. The authors also performed post hoc analyses in smaller subpopulations of patients. They found no evidence of benefit of revascularization in patients with bilateral renal artery stenosis >70% or renal artery stenosis >70% in a single functioning kidney. There was also no significant difference in outcome between patients with severe renal artery stenosis vs those without severe disease. Renal artery revascularization for atherosclerotic disease should now be a rare event. Treatment of renal artery stenosis simply because "it can't be a good thing" cannot be justified.

Secondary Intervention After Endovascular Abdominal Aortic Aneurysm Repair

Conrad MF, Adams AB, Guest JM, et al. Ann Surg 2009;250:383-9.

Conclusion: Secondary interventions are common after endovascular aneurysm repair but do not adversely affect aneurysm related death or overall actuarial 5-year survival.